US009095424B2

(12) **United States Patent**
Kahook et al.

(10) **Patent No.: US 9,095,424 B2**
(45) **Date of Patent: Aug. 4, 2015**

(54) **MODULAR INTRAOCULAR LENS DESIGNS AND METHODS**

(71) Applicants: **The Regents Of The University Of Colorado, a body corporate**, Denver, CO (US); **ClarVista Medical, Inc.**, Aliso Viejo, CA (US)

(72) Inventors: **Malik Y. Kahook**, Denver, CO (US); **Naresh Mandava**, Denver, CO (US); **Paul McLean**, North Oaks, MN (US); **Robert E. Atkinson**, Lake Elmo, MN (US)

(73) Assignees: **ClarVista Medical, Inc.**, Aliso Viejo, CA (US); **The Regents of the University of Colorado**, Denver, CO (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/748,207**

(22) Filed: **Jan. 23, 2013**

(65) **Prior Publication Data**

US 2013/0190868 A1 Jul. 25, 2013

Related U.S. Application Data

(60) Provisional application No. 61/589,981, filed on Jan. 24, 2012, provisional application No. 61/677,213, filed on Jul. 30, 2012.

(51) **Int. Cl.**
A61F 2/16 (2006.01)

(52) **U.S. Cl.**
CPC ***A61F 2/1613*** (2013.01); ***A61F 2/16*** (2013.01); ***A61F 2/1648*** (2013.01); *A61F 2002/1689* (2013.01)

(58) **Field of Classification Search**
CPC A61F 2/1613; A61F 2/1648; A61F 2002/1681; A61F 2002/1697; A61F 2/1662; A61F 2/1664; A61F 2002/161; A61F 2/1694; A61F 2250/006; A61F 2250/0062
USPC 623/6.11, 6.32, 6.34
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,168,547 A * 9/1979 Konstantinov et al. 623/6.41
4,409,691 A 10/1983 Levy

(Continued)

FOREIGN PATENT DOCUMENTS

EP 1 138 282 A1 10/2001
EP 1 296 616 B1 5/2012

(Continued)

OTHER PUBLICATIONS

PCT International Search Report and Written Opinion for corresponding International Application No. PCT/US2013/022752 mailed on Apr. 19, 2013, 11 pages.

(Continued)

Primary Examiner — Howie Matthews
(74) *Attorney, Agent, or Firm* — Bookoff McAndrews, PLLC

(57) **ABSTRACT**

A modular IOL system including intraocular primary and secondary components, which, when combined, form an intraocular optical correction device, wherein the secondary component is placed on the primary component within the perimeter of the capsulorhexis, thus avoiding the need to touch or otherwise manipulate the capsular bag. The secondary component may be manipulated, removed, and/or exchanged for a different secondary component for correction or modification of the optical result, on an intra-operative or post-operative basis, without the need to remove the primary component and without the need to manipulate the capsular bag. The primary component may have haptics extending therefrom for centration in the capsular bag, and the secondary component may exclude haptics, relying instead on attachment to the primary lens for stability. Such attachment may reside radially inside the perimeter of the capsulorhexis and radially outside the field of view to avoid interference with light transmission.

18 Claims, 24 Drawing Sheets